THE PRESENT STATUS OF PHYSICAL THERAPY

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During the last few years the medical profession has begun to realize the value of physical measures of treatment.

The impetus which such therapeusis received from its use in the Army, Navy, Public Health and Veterans' Bureau Hospitals, has been increased by civilian agencies.

"The recognition of physical therapy as a legitimate and important branch of medicine by the American Medical Association, and the appointment by it of a Council on Physical Therapy, undoubtedly marked the dawn of a new era in this art."

The Council, composed of clinicians, pathologists, physiologists, biophysicists and physicists, is earnestly attacking the manifold problems which this subject presents. To quote: "The Council on Physical Therapy of the American Medical Association will endeavor to point out to the medical profession the advantages and disadvantages of physical therapy, so that its abuses may be reduced to a minimum and its scientific possibilities may be appreciated." To this end many laboratory and clinical investigations are being made under authoritative auspices. Basic papers on the subdivision of physical therapy—that is, massage, muscle reëducation, electrotherapy, hydrotherapy and mechanotherapy—either have been, or shortly will be, published in the *Journal of the American Medical Association.*

The therapeutic claims, with supporting scientific evidence submitted by the various manufacturers of electrotherapeutic apparatus, are critically examined by the Council. If inconclusive, further evidence is required, or if the subject is of sufficient basic importance it is referred to some medical center with the request that it be submitted to scientific, clinical and laboratory tests. Soon the Council hopes to publish a tentative list of approved

apparatus of those firms whose products are not only scientifically designed and will deliver what they are claimed to, but also whose literature is free from the fairy tales of pseudo-science and impossible biology. In short, the Council on Physical Therapy hopes to accomplish for this subject the same "de-bunking" results which the Council on Pharmacy has consummated for the pharmaceutical manufacturers and those specializing in miraculous patent medicines.

Soon the medical schools will be requested to make such revision of their curricula that adequate undergraduate instruction shall be given in physical therapy. Several plans will be submitted for their consideration. The problems of postgraduate instruction will also be stressed and several solutions will be suggested, such as standardized courses either directly in the medical schools or as university extension courses. Systematic courses under the auspices of State, County, or local societies will be urged and a list of speakers qualified to lecture on certain subjects may be offered. The liberal inclusion of papers on physical therapy in medical conventions will be advised.

When the medical profession at large realizes that the proper application of physical measures of treatment is an effective answer to the challenge of the cults the demand for further instruction will be insistent.

That such instruction is necessary is best shown by the rapidity with which some alleged physiotherapists have been made. Not long ago a one or two weeks' course under commercial auspices was sufficient; now, an enterprising manufacturer advertises that the possession of his piece of electrical apparatus and three hours' study of his compendium of electrotherapy will make its proud possessor a full-fledged physiotherapist (electrotherapeutic branch) competent to cure the ills of man or beast.

The Council on Physical Therapy recently sent questionnaires to seventy-one medical colleges; forty-one reported some instruction in physical therapy; nineteen re-

ported no instruction; two were considering the introduction of such courses; one institution reported that it was organizing a course. A month later three schools reported that courses were being organized, and still three others that since the questionnaire, departments had been formed.

The complaint has been made that the Council has made slow progress and that its work has consisted mainly of promises of what it intends to do. It will very soon be evident, however, that such is not the case. Medicine for centuries was in its swaddling clothes surrounded by the incantations of the medicine man, the soothsayer and the oracle. Even now if we listen to a small but vociferous group we might conclude that medicine had reverted to dream books and interpreters thereof. Surgery also has slowly emerged from the hands of the barber. Much of the mysticism which enshrouded physical therapy and which consequently made it a choice morsel for the quack and the unscrupulous physician has been removed. It is now recognized that one or more of the following properties are inherent in all physical measures of treatment—namely, chemical, thermal, mechanical and psychical. The latter, psychical, has been considered by many to be its only effect. It is true that all therapeusis has greater or less psychical value. It may seem to loom large in physical therapy, but constantly increasing laboratory studies show that relatively it has little more than that which exists in medicine and surgery, and that it is infinitely less than that which exists in much of the modern neurology. Such an attribute is a valuable asset and its possession should not be held up as a reproach against its possessor. In the *Journal of the American Medical Association* it was stated that among the various laboratory investigations the following were significant:

"1. The influence of ultra-violet rays on the blood chemistry, whereby the calcium and the phosphorus content of the blood were generally augmented.

2. The power of diathermy in suitable cases of non-union or delayed union of bone in hastening the formation of callus.

3. The more rapid disappearance of calcium carbonate in bursitis with calcification by means of the same diathermy.
4. The increase in basal metabolism under autocondensation.
5. The increase in urinary solids, hitherto deficient, by autocondensation, and at times by the sinusoidal current.
6. The deposition of calcium salts in rickets.
7. The influence of actinic energy not only on the hemoglobin content of the blood but also on the number of red cells, and not infrequently on their differential count.
8. The increase in the alkali reserve under the administration of radiant heat."

As has been said many times, physical therapy is not a separate cult. It is a part of the bone and sinew of medicine and surgery. It is their adjunct to ensure functional and physical restoration.

In industrial medicine, physical therapy properly used, by shortening the time of disability, results in appreciable economic gain to the patient, to the industry, and to the community at large. The Rehabilitation Clinic in Syracuse, New York, is an example of this. Here, in fifty-one months, four hundred and seventy-four cases have shown a saving of $163,000 over the evaluation of the state board. Properly applied physical therapy—Aye, there is the rub! In many places, insurance companies have bitterly complained of bills rendered for alleged physical therapy which has not shortened the time of disability and which has greatly augmented the industrial financial loss.

Too often a physician, a possessor of one or two pieces of apparatus, his only knowledge a salesman's say so, boldly holds forth as a specialist in physical therapy. As a warning against this the Council on Physical Therapy has said: "A physician who has installed a diathermy machine or an ultra-violet ray generator can do good in carefully selected cases with one of these methods. He is not, however, fully equipped to render physical therapeutics. As a rule, it is the careful combination of several

physical agencies that gets the best results." This combination of physical measures is the keynote to success It frequently is not enough to prescribe one or more of the various forms of electrical manifestations and omit from the prescription massage, muscle reëducation, or hydrotherapy. Such treatment is not properly applied physical therapy. Because of this, though it is a short-sighted policy, many insurance companies, and some state industrial boards have fixed fees for physical therapeutic treatment which are too low to cover the actual expense of an adequate treatment. What is the answer? It lies in constituting a preferred class. In some states the medical board has the right, through the authority invested in it, to examine and register persons desiring to practice any limited branch or branches of medicine and surgery, and to establish rules and regulations governing such limited practice. In this way the incompetents would be weeded out and those thus registered as specialists in physical therapy would soon prove that the laborer was worthy of his hire by the more rapid return of the industrially incapacitated to gainful occupations.

In the limited time at my disposal it will be possible to consider in detail only a few of the ramifications of this subject.

The value of electrosurgery in properly selected cases is so well known that discussion of it here would be repetition.

There is, however, one electrical manifestation which is in popular favor, both lay and medical—the ultra-violet ray. This is pregnant with possibilities for good and for evil. The newspaper and periodical write-ups have created an intense public interest. It is natural that the fond parent should desire that his offspring, in the months deficient in ultra-violet radiation, should enjoy Florida sunshine, while attending school in northern climes. Some of the manufacturers of apparatus have been quick to enter this profitable field, and though ostensibly under the

guise of selling or renting apparatus only under a physician's prescription, yet in some instances they have conducted a house to house canvass of likely prospects. Clubs also have been shown the income to be derived by the installation of sun rooms. The bulk of this is not under any adequate medical supervision. If the apparatus sold delivered a spectrum which was analagous to the solar, the risk would be less—though even here untoward results have been observed. The solar ultra-violet rays, the so-called near or vital, are those to which the human organism has been tuned to respond. In the most popular form of ultra-violet irradiation, the mercury vapor arc, the ultra-violet radiation consists of these longer wave lengths plus others much shorter than those to which the body is accustomed. Under such conditions the medical supervision should be careful and constant. Because of untoward results, the French Government recently has placed the use of ultra-violet under the laws of practice of medicine act and only physicians can legally employ it. In some cases a markedly decreased resistance of the hæmapoietic organs ensues. In other cases ultra-violet radiation has acted like a protein shock bringing about a prolonged negative phase. After the ingestion of certain articles of food or hypnotics of the barbital group, sickness may ensue. Hence, under such conditions the sale of ultra-violet apparatus to the laity or clubs should be restricted to that in which the spectrum is limited to that of the solar, that is not lower than 2900 Angström units. It has been claimed that by repeated skin irritation cutaneous cancer may be produced. I have yet to find an authenticated case of this. On the other hand, certain skins markedly susceptible to the sun's rays may develop an intractible chronic eczema.

The reverse of this picture is a brighter story. Take for example tuberculous conditions, as lupus vulgaris, tuberculosis of the bones (surgical tuberculosis), tuberculous adenitis, tuberculous peritonitis, tuberculous kidney, and, less successful, intestinal tuberculosis. In these conditions

the results are suprisingly good. *Pulmonary tuberculosis.* Here, ultra-violet rightly used may be a valuable adjunct. Too long an exposure over too great a surface is generally followed by disastrous results.

Probably the Vitamin D evolved from the action of ultra-violet on the cholesterol of the skin accounts in part for the increased calcium and phosphorus content of the blood and it affords at least a plausible explanation for the results obtained in rickets, spasmophilia, and certain deficiency diseases.

Indolent wounds, discharging sinuses and *cutaneous ulcers* respond at times miraculously. In diseases of the skin the results are variable. Certain types of eczema do well; others poorly; and still others are made worse. *Psoriatic* patches generally disappear but their reappearance may be looked for any time thereafter. *Sycosis, tinea,* and *impetigo contagiosa* respond quickly to this treatment. In *herpes zoster,* if used early, it is almost a specific and apparently there is less likelihood of disagreeable after paresthesias. *Pruritus,* causative factor if found of course removed, is generally relieved. In *acne vulgaris* the results are as a rule excellent though at times it may stimulate a growth of hair on the face. If this phenomenon would occur consistently on areas where it is so often deficient, the manufacturers of ultra-violet apparatus would be obliged to build additions to their factories. In *alopecia areata* there is frequently re-growth of hair. The *Journal of the American Medical Association* has reported a number of cases of *purpura hæmorrhagica* and *hæmorrhagic* disease of the newborn which have been so markedly benefited by general ultra-violet irradiation as to warrant its employment in such pathology. Ultra-violet seems to be valuable as an adjunct to the modern dietetic treatment of pernicious anemia. At the Boston City Hospital cases seemingly at a standstill have promptly improved when general ultra-violet irradiation was added to the previous treatment. In blood pressure the administration of ultra-violet gives variable results, the tendency being towards

reduction. This may be due in part to dilatation of the cutaneous capillaries.

Recent laboratory studies apparently show:

1. That short exposures to ultra-violet increases the hemoglobin content and number of red cells to a slight extent in normal blood. After cessation of treatment there is a rapid return to normal.
2. That short exposures also have the same effect in cases in which the red blood cells and hemoglobin are lower than normal. They tend to remain normal.
3. That after a single exposure the blood platelet count is increased, successive daily doses increases the count progressively. The immediate effect is a sharp drop followed by a marked rise above normal.
4. That there is an initial drop of the lymphocytes as a constant reaction to all ultra-violet exposure whether in single or successive daily doses. If a massive dose is given a leukopenia of several days' duration results. This is suggestive in view of the tendency towards self-treatment.
5. That if the dose is not too great, ultra-violet wave lengths shorter than 3000 Angström units produce, following the initial drop, an increase in the lymphocytes.
6. That wave lengths shorter than 2750 Angström units have no effect on the polymorphonuclears, while wave lengths between 2750 and 3200 Angström units will produce a sharp rise which attains its maximum in five hours. This increase lasts for several days.

All laboratory and clinical observations show that there is an optimum dose of ultra-violet and that an excessive dose may be harmful. At present there is no exact method of standardizing dosage, though for the average practitioner the lithopone unit of Dr. Janet Clark will be found to be the most satisfactory.

The relative merits of heliotherapy, the carbon arc, and the mercury vapor arc are still *sub judice*. It is probable that specific indications will be found for each. Factors

foreign to the carbon and mercury arc enter into the use of heliotherapy for here we have the effects of variation of temperature, frequently of altitude, the metabolic whip of the breeze on the naked body, and generally a complete change of environment and dietetic regime.

Diathermy is a close second to the ultra-violet in the professional mind. This form of high frequency electricity has the property, because of internal tissue resistance, of inducing heat within the tissues themselves. The hot water bottle, the electric heating pad, electric light applicator, the hot soak, and the whirlpool bath have a more or less superficial effect due to the limited heat conduction power of the skin. It is true that vaso-dilatation does take place. The blood stream becomes warm to a greater or less degree and in that way may act reflexly through stimulation of the central heat centers, and the blood from the deeper lying structures is determined to the skin, thus producing depletion if there is deep seated engorgement. On the other hand, with diathermy, the skin is less of a factor. Its resistance and that of the tissues in the path of the current causes a deeper seated heat to be generated than by any method with which we are now conversant. A short time ago pretty geometrical figures were drawn showing that given two unequal bases the intersection of diagonal lines drawn from the ends of one base to the other would be the point of greatest heat intensity. This is not strictly true though the point of greatest heat will be nearer the smaller electrode. In living tissue we have another story, for here the circulation of the blood dissipates an appreciable amount of the heat and the varying degrees of resistance of the tissues encountered also play their part. Some experiments seemed to prove that the heat penetration was relatively slight, though far superior to any other method, but more careful and scientific laboratory check-ups with more sensitive apparatus show that in the living subject tissues are heated to considerable depths. In general, diathermy may be used in any condition in which heat will give relief. Its main contra-indications are where by dilatation of blood vessels

hemorrhage may ensue or where there is pus without drainage. As its main component is heat, and if proper attention is paid to technic, there is less chance of harming the patient through an ill-advised prescription than there is in the use of ultra-violet or the other subdivisions of physical therapy. In combination with ultra-violet it is useful in certain types of asthma and bronchitis. In subdeltoid bursitis, with or without calcification, added to galvanism, massage and manipulation it ordinarily will afford speedy relief.

Static electricity is an anathema to many, and a Mecca to others. To one who is able to steer a middle course it will be of great service. Too often, though, in the form of the static wave current it is prescribed for conditions in which massage and muscle training would be infinitely better.

Only the pathology commonly met with should be considered in a summary like this. Especial attention should also be paid to any procedure or practice which if persisted in might harm the patient or the fair name of physical therapy.

The promiscuous rental of radium to physicians is an example of the latter. This may be dangerous both to the physician and the patient. A surgeon who would not undertake an unusual operation without infinite attention to detail will without previous experience or taking the time to learn the fundamental principle governing the action of this radio-active substance, fill out a blank giving the site, size and character of the lesion and attempt to follow the instruction of the radium specialist of the company. This specialist, who may not be a physician, will give directions for the treatment of a patient he has never seen, to a man who knows little of the risks, reactions and dangers of such treatment. The result may be good, or it may lead to injurious or disastrous consequences.

Fractures. According to insurance companies' statistics, and a report of a special committee of the American

College of Surgeons, fractures as a rule are rather badly handled. A part of this is frankly bad surgery or poor reduction; but most serious of all is the loss of function after union has taken place. This is generally due to too long immobilization and the non-use of physical measures of treatment. If physical therapy is started early, stiffness and ankylosis are generally prevented. Trophic changes are minimized and the end result is not only bony cure but functional restoration.

Stiff and Painful Knees. This affliction, occurring after middle age, may or may not show any demonstrable pathology. Diathermy and galvanism will generally, if there is no mechanical reason to prevent it, give for many months a symptomatic cure. The pain will be relieved and the range of motion will be greatly increased, even to normal. There are apt to be exacerbations but these in turn yield to a similar treatment.

Pneumonia. Discounting all therapeutic claims made for the use of diathermy in pneumonia the one fact that in the majority of cases pain is relieved and the patient has more sleep, justifies its use as a routine measure. In hospitals where this is employed as a routine measure the amount of narcotics or anodynes has been decreased more than one-half. The fear that the treatment will disturb the patient is not well founded for generally he will ask if it is not time for the next application.

Non-Union or Delayed Union. Here again given adequate fixation, diathermy or ultra-violet irradiation, or both, will ensure the formation of callus and if other suitable physical therapeutic measures be added functional restoration will result. Without fixation the chance of success is relatively small.

Arthritis. The etiological factors should be sought for and if found, eliminated. Frequently, under physical measures of treatment, symptomatic cures of many months in duration will be effected. The prescription will vary. In any event it should be a composite one selected from

the following: Hydrotherapy, heat, including the electric light bath cabinet, diathermy, galvanism, static electricity, massage carefully guarded as to time and character, and gentle manipulation.

There are many omissions. Much that is of real value has been left out. Some of the abuses of physical therapy both in its use and its non-use have not been mentioned. My only aim has been to show that:

1. Physical therapeutic measures of treatment are being placed on a sound and rational basis.
2. Physical therapy has secured civil and governmental recognition as one of the triad of medicine, surgery and physical therapy.
3. Nearly all the mysticism and much of the empiricism formerly inherent in physical therapy has been removed.
4. The wide-spread laboratory and scientific clinical investigations which are now under way will soon make it a more exact art.
5. In many conditions complete physical and functional restoration can only be secured by the use of physical therapeutics as an adjunct to standard medical and surgical procedures.
6. To secure this teamwork is essential.
7. Physical therapy should be practised on a broad and comprehensive basis.
8. If it is so practised not only will the time of disability be shortened but many who otherwise would have been hopeless cripples will be returned to financial independence.

Because of the standing physical therapy has already attained it will not in the future be necessary to close in the words of John Wesley, the author of the first book in English on electricity, who, in 1760, said: "Before I conclude I would beg one thing—it is that none of them would condemn they know not what; that they would hear the cause before they pronounce its sentence."